AU/ACSC/103/1998-04

AIR COMMAND AND STAFF COLLEGE

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WINNING WARS QUICKER, WITH LESS CAUSUALTIES, AND RESULTING IN A BETTER STATE OF PEACE

by

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A Research Report Submitted to the Faculty

In Partial Fulfillment of the Graduation Requirements

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Maxwell Air Force Base, Alabama

April 1998

REPORT DOCUMENTATION PAGE

Form Approved OMB No. 0704-0188

1. REPORT DATE (DD-MM-YYYY)	2. REPORT TYPE	3. DATES COVERED (FROM - TO)
01-04-1998	Thesis	xx-xx-1998 to xx-xx-1998

4. TITLE AND SUBTITLE
Winning Wars Quicker, With Less Casualties, and Resulting in a Better State of Peace
Unclassified

5a. CONTRACT NUMBER
5b. GRANT NUMBER
5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)
Golden, Liesel A. ;
Harris, William S. ;
Jackson, Jeffrey A. ;

5d. PROJECT NUMBER
5e. TASK NUMBER
5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME AND ADDRESS
Air Command and Staff College
Maxwell AFB, AL36112

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING/MONITORING AGENCY NAME AND ADDRESS
,

10. SPONSOR/MONITOR'S ACRONYM(S)
11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
APUBLIC RELEASE
,

13. SUPPLEMENTARY NOTES

14. ABSTRACT

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15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE	Public Release	69	Fenster, Lynn lfenster@dtic.mil
Unclassified	Unclassified	Unclassified			19b. TELEPHONE NUMBER International Area Code Area Code Telephone Number 703767-9007 DSN 427-9007

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Acknowledgements

We would like to gratefully acknowledge the assistance and guidance of our Faculty Research Advisor, Mr. Matthew Caffery. Without his guidance this report would not have been possible. Inputs from Majors David "Jake" Timms, Phillip "Dog" Senna and many others guided us to data that made this effort come together and take on a life of its own. Additionally, we would like to thank the Wargaming Center, especially Captain Min Baker, for assistance with the JEMM system.

We would also like to acknowledge the unfailing support of our families—allowing us to be away for long hours and late nights to gather data, write and rewrite drafts. You helped us focus and kept us on track.

Abstract

This paper examines possible force structure changes that will enable Americans to win wars quicker, with fewer casualties and resulting in a better state of peace. To do this we used the technology and air power theory decision model conceived by Mr. Matt Caffrey and developed by Major Kenneth J. Moran in ACSC Project 97-03. The model looks at issues through the lens of four factors: internal, external, history, and the future. The internal factors include budget and force structure of the US military forces as outlined in the Bottom Up Review (BUR) and Quadrennial Defense Review (QDR) and several defense reviews. External factors discuss the exponential increase in the number of international airports that can be adapted for military use. Next, we review the historical contributions of AF engineers and their capability to transform international airports into operational air bases. Future defense environmental factors include the US' stated preference for coalition warfare. Additionally, we analyze the costs and capabilities of land-based and carrier-based air power and their contributions to halting two major theater wars using two different force structures. Considering these factors, we suggest reducing the number of carrier battle groups from 12 to 9 and increasing the number of tactical fighter wings from 20 to 26. This research proves that land-based airpower brings twice as many aircraft, four times the sortie rate and three times the firepower to bear on the enemy compared to carrier-based airpower. These additional offensive sorties lead to a 20 percent faster halt of the adversary.

Chapter 1

Introduction

> *…[L]aws and institutions must go hand in hand with the progress of the mind…As new discoveries are made, new truths disclosed, and manners and opinions change with the changing circumstances, institutions must advance also, and keep pace with the times.*
>
> —Thomas Jefferson

In August of 1950, Americans were in grave peril of being pushed off the Korean peninsula. Earlier the communists had overrun the South Korean capitol and both the country's jet capable airfields, now the lives of thousands of American servicemen and the fate of the democratic republic of Korea hung in the balance. The North Korean Army was poised to eliminate the last vestiges of the United Nations (UN) forces by breaking through the Pusan perimeter. With little hope of reinforcement, commanders on the ground began preparations for "a fight to the last man."[1] "These were the desperate days of the Pusan Perimeter, when the Americans were nearly forced out of Korea altogether. "The carrier planes flew mission after mission in close support of troops, sometimes bombing targets in the area of the North Korean lines."[2]

In 1950, carrier air saved the day but with the explosion of international airfields and the end of the cold war, warfare has changed significantly. Now coalition warfare and land based airpower can save the day faster than the carrier battle group (CVBG).

All US strategy from the National Security Strategy (NSS) to individual service strategy states our propensity to fight in a coalition or alliance with and for our allies and friends. Our National Military Strategy (NMS) states that "while retaining unilateral capability, whenever possible we must seek to operate alongside alliance or coalition forces, integrating their capabilities and capitalizing on their strengths."[3] History records that all our major foreign wars were coalition wars. For the unilateral capability outlined in the NMS we desire, we suggest that less carriers can do the job.

"Decisive force in the early stages of a crisis can be critical to deterring aggression"[4] states our 1997 National Military Strategy. "In situations such as a major theater war, the Armed Forces must be able to gain the initiative quickly. Our forces must have the capability to halt an enemy."[5] To do this most efficiently, we must be able to generate more sorties with aircraft that can carry significant firepower and deliver it with precision. That equates to theater air assets which can generate four times the number of sorties delivering three times more tons of ordnance per day than carrier air for less than half the cost of a CVBG. Ultimately that means halting the fight quicker, resulting in less casualties and a better end state.

The CVBG brings an excellent forced entry capability and the capability to act unilaterally—but what are the opportunity costs? How much of a fixed, at best, military budget are we able to dedicate to these capabilities that in the past have usually proven not to be necessary? Combined with the fact that carrier air brings only 3-5% of the firepower to the major regional conflict fight they are most valuable for "limited, punitive strikes"[6] in General Schwarzskopf's words. Twelve carriers are not needed for this mission. Forward presence can be accomplished in other less expensive ways. The

General Accounting Office (GAO) states "relying more on surface combatants and amphibious assault ships…for presence and crisis missions could allow carriers to remain closer to their home ports and permit a smaller carrier force. Options are available to enable the Navy to maintain continuous presence…with considerably fewer than the notional 15 carriers."[7]

Given the overwhelming advantages of theater air and the likelihood of coalition warfare we propose that less carrier air is needed. Theater air, using international airports converted to air bases in less than 72 hours, can provide the US with the decisive firepower to deter or halt an adversary quicker resulting in less American, allied, coalition, and enemy casualties.

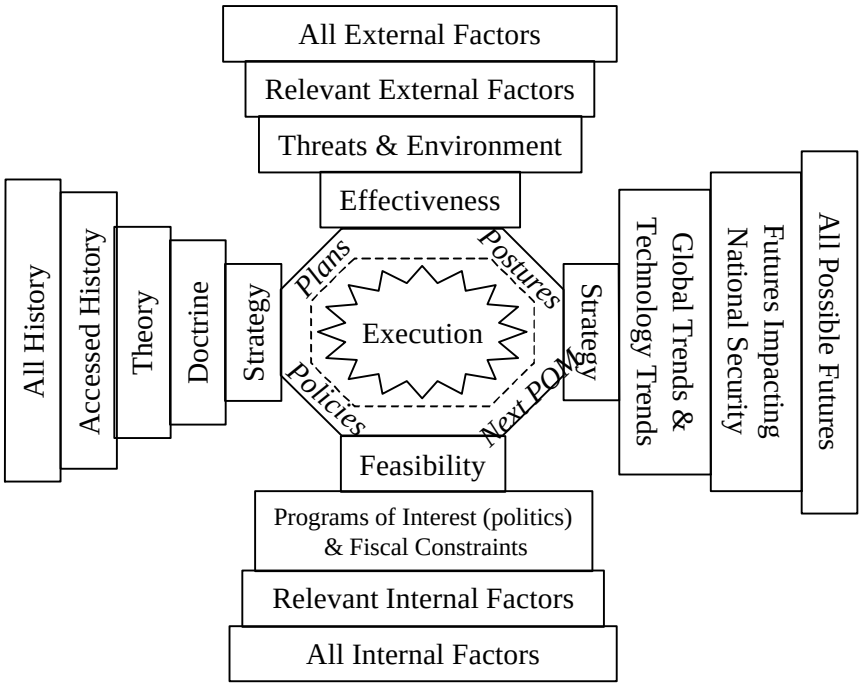


Figure 1. Temporal and Spatial Context for Technology Decisions

Methodology

In this paper, we will follow Major Kenneth J. Moran's, ACSC Class of 1997, model of temporal and spatial context for technology decisions. He advocates looking at decisions from four approaches or viewpoints: internal, external, historical, and future factors (see Figure 1).

Using these four viewpoints, we will examine the Bottom-Up-Review (BUR), the Quadrennial Defense Review (QDR), Lockheed-Martin and Headquarters Air Force studies to determine the effects of internal factors on our force structure. Next, we will look at the external factors such as the explosion of civilian runway construction throughout the world. The history viewpoint includes civil engineers' past efforts to build theater air bases close to the action and its' result on the outcome of battle. Additionally, their ability to adapt International airports and build airfields at a bare base location will be examined. The future viewpoint includes the US preference for coalition warfare. We will then perform an extensive analysis of the comparative capabilities and costs of the CVBG air wing and the Tactical Fighter Wing equivalent (TFWE). Finally, we will outline our recommendations for the future, including the best way to win war quicker, with fewer casualties and resulting in a better state of peace.

Notes

[1] Hoyt, Carrier Wars, p 114
[2] Hoyt, Carrier Wars, p 233
[3] National Military Strategy, p12
[4] National Military Strategy, p20
[5] National Military Strategy, p25.
[6] Woodward, p. 228.
[7] CVBG Cost Analysis &AEF Comparison, slide 11.

Chapter 2

Internal Factors

Victory smiles upon those who anticipate the changes in the character of war, not upon those who wait to adapt themselves after the changes occur.

—Douhet

Shifting our focus inward we will explore the Moran internal factor elements of the technology context model. For this paper, internal factors include forces within the Department of Defense (DOD) and the defense industry. To this end, we will examine the BUR, QDR, and several internal studies to determine their influence on how we fight and win wars.

Bottom-Up Review: Forces for a New Era

"The Cold War is behind us. The Soviet Union is no longer. The threat that drove our defense decision making for four and a half decades—that determined our strategy and tactics, our doctrine, the size and shape of our forces, the design of our weapons, and the size of our defense budgets—is gone."[1] The demise of the Soviet Union and the end of the Cold War have changed the strategic environment in which US forces must operate. The environment is, however, still fraught with dangers that we must be prepared to face. These dangers include the proliferation of nuclear weapons and

weapons of mass destruction, regional dangers posed by rouge states, dangers to democracy and reform, and economic dangers to our national security.

"With these new dangers come new opportunities—opportunities to build a larger community of democratic nations, promote new regional security arrangements, drastically reduce strategic nuclear arsenals, and reduce our defense budgets to allow investments in other areas vital to our prosperity."[2] (BUR, p 2)

The Bottom-Up Review Methodology

The BUR selected "the right strategy, force structure, modernization programs, and supporting industrial base and infrastructure to provide for America's defense in the post-Cold War era."[2] The methodology included a systematic process to ensure all areas vital to our defense were thoroughly examined. The five-step process began by assessing the post-Cold War era, and particularly the new dangers, opportunities, and uncertainties it presents. Next, they devised a US defense strategy to protect and advance our interests in this new period. The third step was to construct building blocks of forces to implement this strategy. Step four combined these force building blocks to produce options for our overall force structure. The final step ensured we have adequate acquisition plans to modernize the forces, defense foundations to sustain them, and policy initiatives to address new dangers and take advantage of new opportunities.

Throughout the review, the following "underlying principles" guided the effort. In his inaugural address, President Clinton pledged to keep America's military the best trained, best equipped, best prepared fighting force in the world. To maintain this focus the panel decided it must keep our forces ready to fight, maintain the quality of our people, and maintain the technological superiority of our weapons and equipment.

Major Regional Conflicts

With the demise of the Soviet Union, we no longer need to be prepared to fight a numerically superior enemy. We must now turn our focus to regional conflicts that threaten US vital interests. To support this change in focus the BUR developed two scenarios as planning tools to guide the process. These scenarios were intend to merely illustrate the concept of fighting two major regional conflicts (MRC) and not predict future conflicts. While they reviewed a number of scenarios, the two that best illustrated the dangers envisioned aggression by a remilitarize Iraq against Kuwait and Saudi Arabia, and by North Korea against the Republic of Korea. In each scenario, they examined the performance of projected forces in relation to many critical parameters, including warning time, the threat, terrain, weather, duration of hostilities, and combat intensity

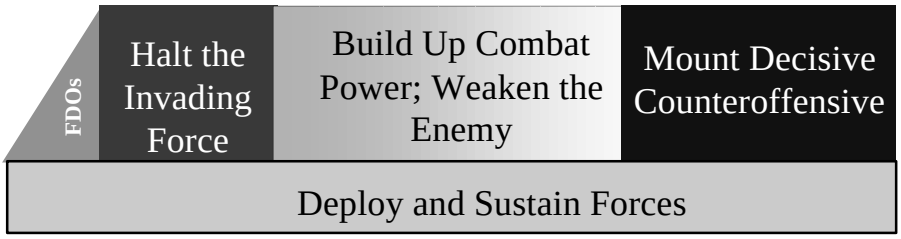


Figure 2. BUR View of Conflict

Four Phases of US Combat Operations

The BUR developed four phases that US combat operations will likely take: (1) halt the invasion, (2) build up US combat power in the theater while reducing the enemy's, (3) decisively defeat the enemy, (4) provide for post-war stability (see Figure 2). The BUR goes on to describe the types of forces needed to fight during each of the four

operation phases and the supporting forces required to ensure they are logistically capable of continuing the fight.

Recommended Force Structure

The recommended force structure is depicted in Table 1:

Table 1. BUR U.S. Force Structure—1999

Army	• 10 divisions (active) • 5+ divisions (reserve)
Navy	• 11 aircraft carriers (active) • 1 aircraft carrier (reserve/training) • 45-55 attack submarines • 346 ships
Air Force	• 13 fighter wings (active) • 7 fighter wings (reserve) • Up to 184 bombers
Marine Corps	• 3 Marine Expeditionary Forces • 174,000 personnel (active end strength) • 42,000 personnel (reserve end strength)
Strategic Nuclear Forces (by 2003)	• 18 ballistic missile submarines • Up to 94 B-52H bombers • 20 B-2 bombers • 500 Minutemen III ICBMs (single warhead)

Source: The Bottom-Up Review: Forces For A New Era, Les Aspin Secretary of Defense, 1 September 1993.

Quadrennial Defense Review

While the QDR recognized the contributions of the BUR, the Secretary of Defense felt it was necessary to address concerns that were not fully explored in the BUR. "The shape-respond-prepare strategy defined in the QDR process builds on the strategic foundations of past reviews and our experience since the end of the Cold War."[3] While the BUR contributed the two MRC concepts and primarily focused on structuring the force to accomplish this task, the framers of the QDR felt it was equally important to

focus on maintaining a forward presence. Additionally, an overriding factor in the QDR was structuring a force that could meet the requirements of two MRC and forward presence but also remain within constrained defense budgets. The QDR envisioned a relatively constant budget of $250 billion per year into the foreseeable future. The QDR force structure focused on ensuring that the Joint Vision (JV) 2010 operational concepts could be carried out. These operational concepts of dominant maneuver, precision engagement, full-dimensional protection, and focused logistics frame the capabilities that our future forces must be matched against. The QDR also focused on leveraging the technological and organizational changes in defense brought by the recent Revolution in Military Affairs that would allow all this to be accomplished.

Table 2. QDR U.S. Force Structure - 2015

Army	• 10 active divisions • 530,000 reserve personnel
Navy	• 11 active/1 reserve aircraft carriers • 10 active/1 reserve air wings • 50 attack submarines • 116 surface ships • 12 Amphibious Ready Groups
Air Force	• 12 active fighter wing equivalents • 8 reserve fighter wing equivalents • 4 reserve air defense squadrons • 187 bombers
Marine Corps	• 3 Marine Expeditionary Forces

Source: National Military Strategy of the United States of America "Shape, Respond, Prepare Now: A Military Strategy for a New Era," 1997, p23.

Lockheed-Martin Study

In 1997, the Lockheed Corporation performed a study to help them determine the most lucrative areas for investment in the defense industry. Declining budget projections made it imperative that the industry focus its efforts in the areas that defense planners

were most likely to invest. The first step in targeting these areas was to design a total force structure that meets the national security objectives, is affordable, and establishes a "controlled risk" downsizing approach. From this approach, they developed an investment strategy for future force structure elements.

Study Approach

The approach of the study was, first, to develop databases and trends including scenarios, budgets, weapon system effectiveness, and force structure-budget trade-off assessments. The second step was to define alternative force structure options that would downsize the US military to a structure that would fit within current and projected budget constraints. The options developed covered three major warfighting and downsizing approaches; land-based airpower emphasis; sea-based airpower emphasis; and a pro-rata reduction based on the Bottom Up Review (BUR) percentages. Each of these options had certain elements in common. The common elements included equivalent land combat power, full strategic lift to meet "near-simultaneous" requirement, and retained all the BUR strategic, bomber, and intelligence capabilities.

The next step in the process compared the capability of each option relative to the BUR forces and security objectives based on forward presence, crisis response, and the ability to meet the demands of two nearly simultaneous MRCs. The team used this comparison to select the least risk force structure option and finally, identified the implications these structure changes would have on the current roles and mission of the services and future acquisition plans.

Key Considerations

The important considerations in developing this study were the Federal Defense Budget; National Security Objectives and the threat; the roles, missions, and responsibilities of the services; and the BUR. The study integrated the requirements of these considerations into an overall DOD force structure and acquisition plan.

Budget Constraints

The study asserts that growth in entitlement programs will continue to exert budgetary pressures on the US defense budget. They anticipated that the DOD budget will be capped at $220 billion per year well into the next century. Therefore, defense planners must take a long-term perspective to reconcile the defense responsibilities and force structure with the reduced DOD budget. The study looked out 10-15 years to develop a roadmap from the present force structure to the vision of the future determined by analysis of the changing strategic environment.

Changing Strategic Environment

Changes in the strategic environment have driven a drastic restructuring of our defense force structure. This restructuring has lead to a commensurate reduction in the defense budget from $350 billion per year in the ‘80s to $240 billion per year in the ‘90s. To meet this reduction the BUR recommended cutting our force structure by over 40 percent. However, under closer examination this study determined that even the BUR force structure is not affordable within the $220 billion budget. Using CBO and GAO projections, the study determined that the BUR force would be under-funded by $50-150 billion between 95-99 and $20 billion per year from 2000-15.

Options

The study developed several options for meeting the challenge within the $220 billion defense budget. These options include reducing military readiness by decreasing military and civilian pay and operations tempo, implementing acquisition reform initiatives by adopting commercial business practices or reducing the force structure. A $20 billion per year decrease would result in reduction of 250,000 jobs out of the active military, DOD civilians and the defense industry. Reducing readiness increases military risk, counters the recommendations of the DSB Readiness Study and does not provide sufficient potential savings to achieve the required budget reductions. Additionally, it suggested that acquisition reform should be pursued but the degree to which it can reduce budget shortfalls is very uncertain. By using average annual force structure element costs the study developed several force structure combinations that will fit within the $220 billion budget.

Lockheed-Martin Force Structures

BUR affordability issues will likely result in additional force structure reduction—we need approximately $20 billion per year over the projected budget. The least impact on the BUR National Security Objectives can be achieved if:

1. Navy forces are reduced from 12 Carrier Vessel Battle Groups to 9 and are focused, exclusively, on littoral operations.
2. Credible forward presence and crisis response is designed as a joint operation incorporating the following elements: a Naval Expeditionary Task Forces (NETFs), bomber aircraft, tactical fighter wings (TFWs) and army forces.
3. Redundancies in fighter/attack forces are eliminated
   - USN supports littoral/expeditionary operations.
   - USAF focuses on theater air.
4. Army ground forces are realigned as follows:
   - 12 fully enhanced brigades with improved readiness
   - 22 independent brigades with deployment role

The study recommends realignment of the acquisition plans consistent with revised total force structure: 20 TFWs, 9 carrier vessels/296 ships, USMC amphibious assault capability maintained, 8 active army divisions and 12 fully enhanced brigades, increased sealift.

Colonel Bath Study

In a study conducted by the HQ USAF, Colonel Ron J. Bath reports that heavier reliance on air and space power can halt the war sooner and give the national command authority (NCA) and combatant commander (CINC) more alternatives. According to Colonel Bath and based on the BURs four phases of war, we need to focus on moving to halt as quickly as possible. To do this we must leverage the core competencies of each service. By increasing the availability of air and space assets in the AOR we can increase the sortie rate thus delivering more firepower on the enemy and halt his aggressive advances faster. Once the enemy's advance has been halted the CINC has a myriad of options available—employ diplomatic or economic pressure on the enemy government or if necessary move to the build-up forces phase. The significance of this study is depicted in the following graph. Figure 3 shows the BUR war phases and the friendly combat power in the AOR. As friendly combat power is increased (top line) and brought to bare on the enemy his forces are attrited. Figure 4 shows that by increasing the availability of air and space power into the AOR sooner, the enemy forces are attrited faster and the war effort comes to a quicker solution. This heavier reliance on air power not only ends the war faster it also saves American lives by decreasing the number of Americans required in the AOR and by decreasing the personnel intensive Army and Navy units required to reach the halt phase.

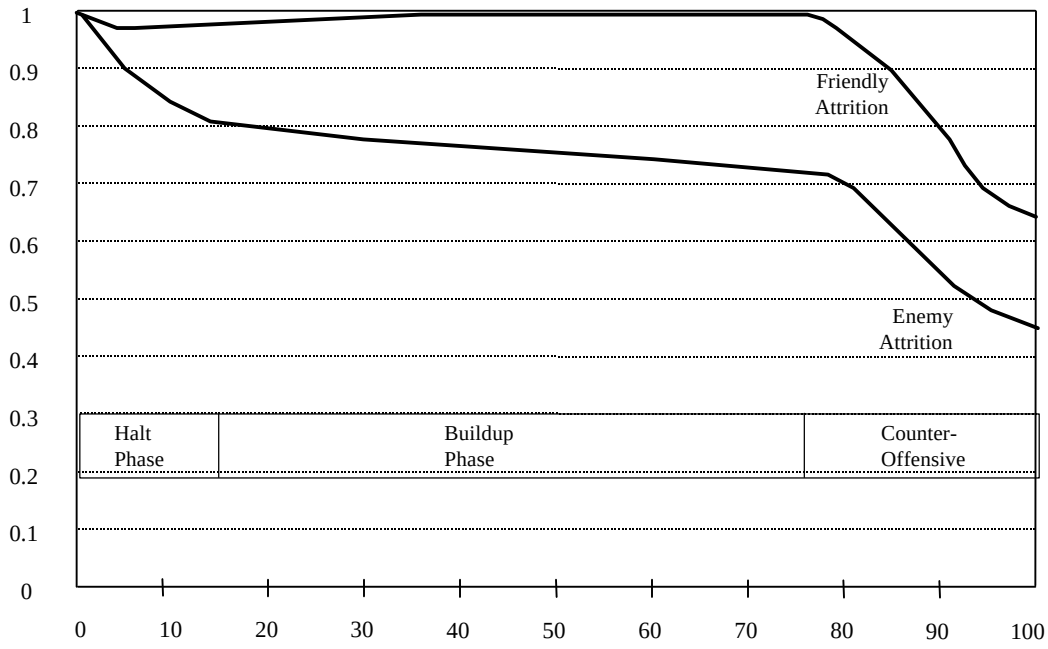


Figure 3. Military Effectiveness—Old Paradigm

Summary

Analysis of internal factors leads to the conclusion that under current budget constraints neither the BUR or QDR force structure is affordable. Lockheed-Martin and Colonel Bath's studies propose that changes in the force structure mix between carrier based airpower and land-based airpower warrants further review. These studies indicate that the war can be halted sooner, and with less expense by decreasing the number of CVBGs to nine and increasing the number of TFWs to twenty-six active wings. In the next chapter we will examine the external factors that would have an effect on this type of decision.

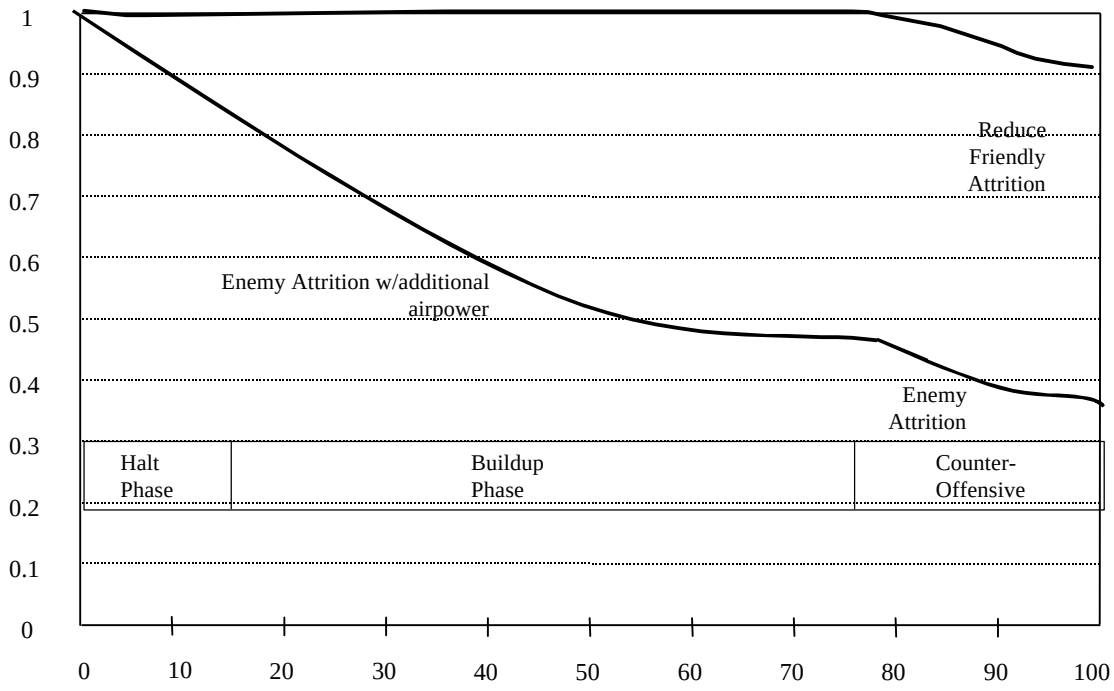


Figure 4. Military Effectiveness-Increased Land Based Airpower

Notes

[1] Report on the Bottom Up Review, p 1
[2] Report of the Bottom Up Review, p 3
[3] Quadrennial Defense Review, p v

Chapter 3

External Factors

The primary objective of Allied forces in the Southwest Pacific is to advance our own network of air bases deep into Japanese perimeter.

—"Hap" Arnold

Moran's model defines external factors as focusing "on the world outside to determine factors that have an effect on our military force structure."[1] The ability to project airpower is a US strength, but the availability of an air base can be a limiting factor. This chapter addresses this availability question by analyzing the explosion of commercial airports and airfields that are now available to provide platforms worldwide for aircraft operations.

Table 3. Paved Runway Growth: 1980 to 1995

Continent	1980	1995	Increase 1980 to 1995
Central America	383	503	31%
South America	554	997	76%
Africa	598	790	32%
Europe	1335	1998	50%
Middle East	223	336	51%
Asia	1110	1981	78%
Australia	229	285	24%
Pacific Ocean	23	61	165%
Greenland	3	5	67%
Total	4458	6936	**56%**

Source: 1) Handbook of Nations, 2nd Edition, Report of "The World Factbook-1981," Grand River Books, Detroit MI, 1981. 2) CIA, The World Factbook 1995-96, Brassey's Washington, 1995.

Airport Expansion

Commercial airports and military air bases have dramatically increased since the Korean War, especially over the past fifteen years as a result in the expansion of tourism and business. Excluding North America paved runways increased from 4458 to 6936, 56 percent, worldwide between 1980 and 1995 (see Table 3).

Runways in North America were not included in this paper since the focus is force projection from the United States. It is also important to note that the seventy-eight percent increase reported in Europe and Asia is not solely a result of new construction. Sources used for this paper did not report the number of runways in the former WARSAW Pact countries until 1995.

Table 4. Number of Paved Runways by Length, 1996

Continent	**> 10,000 ft**	**8,000 to 10,000 ft**	**5,000 to 8,000 ft**
Central America	32	53	149
South America	36	96	299
Africa	124	168	257
Europe	142	481	674
Middle East	117	96	77
Asia	170	546	565
Australia	12	15	137
Pacific Ocean	5	7	31
Greenland	1	1	1
Total	639	1,463	2,190

Source: Central Intelligence Agency, *The World Fact Book 1996-97*, Brassey's Washington 1996.

Not only is the number of runways important, but also the length of the runways. Large frame aircraft (bombers, tankers, and jet cargo aircraft) generally require runways over 8,000 feet for typical operations. Fighter aircraft and C-130s can typically operate on runways only 5,000 feet long. Table 4 identifies the number of runways on the major continents, excluding North America, in three length categories.

The impact of this airfield explosion is that platforms now exist for land based aircraft. As part of their previously discussed study, the Lockheed Corporation examined fifteen different most probable potential scenarios to determine how the US might respond. In thirteen of the fifteen potential scenarios Lockheed determined that the US air response would most likely be land based or land and sea based. Only two of the fifteen (13 percent) required a primarily sea based air power response. This can be more readily seen be looking at Figure 4. As seen, the only locations on the globe that lack significant paved runways over 5,000 feet are Antarctica, Greenland, and possibly the center regions of the Pacific Ocean.

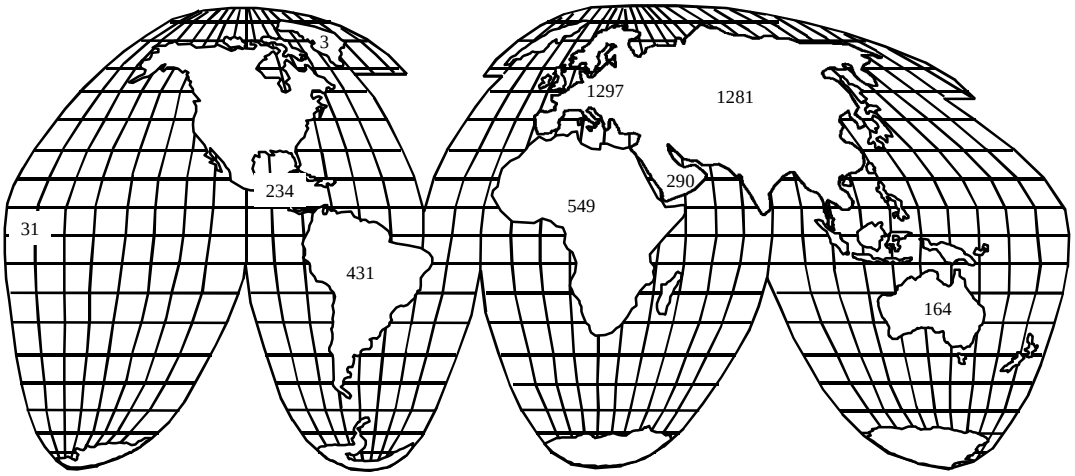


Figure 5. Runways over 5,000 feet by Region of the World

Summary

In 1950, there were two concrete runways in South Korea, today there are 110 paved runways in South Korea. Just as the Korean peninsula has seen an explosion in airfields, the world has seen an explosion in the number of paved airfields worldwide. These

airfields provide the foundation for constructing air bases. Next, we look at some history highlighting the ability of combat engineers to construct and/or modify airfields into air bases.

Notes

[1] Moran, p18.

Chapter 4

History

> *When the United States forces first landed in North Africa, there were nine airdromes that our planes could use. Within a few months there were a hundred. With the Axis on the run, airfields were built even faster. One request was received to build several airfields in the Sbeita sector; seventy-two hours later, all were in use.*
>
> —"Hap" Arnold

"It seems intuitively obvious that history influences today's method of warfare, but how?" Matt Caffrey, Air Command and Staff College, believes that history, theory, doctrine, and execution are connected in an ever-narrowing process. It is primarily from history that we construct our military theories. Accepted theories become doctrine, which in turn serves as a foundation for strategy. Some of these strategies receive the test of war. He underscores the notion that execution becomes a small part of history, and thus the process is cyclical."[1]

Therefore, to fully understand the impact of engineers ability to bring the airfields closer to the fight we will examine the history of combat engineers in recent wars and how engineers have converted a bare base into an operational air base.

The history of combat engineers is testimony to how important runways and the engineers who build them have been to winning or losing wars. A 1995 ACSC thesis entitled "Sustaining Global Power—Combat Engineering 2010," Chapter 2 entitled "Historic Impact of Combat Engineers on Air Operations" contains many historical

examples of combat engineers' roles in the success and failures of air power. Here are just a couple of examples.

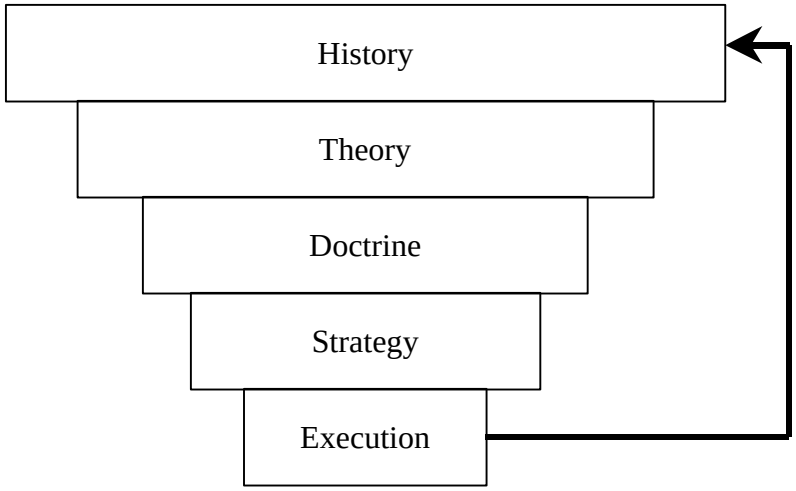


Figure 6. Caffrey History to Application Cycle

In the Battle of Britain the Germans with one paved runway in France had significantly lower sortie rates than the British who had a significant portion of their planes at paved runways giving them a clear sortie advantage. At Kasserine the Allies lacked forward airbases forcing their aircraft to operate at the limit of their range and thus fly fewer sorties than the Germans who had airfields close to the battle allowing each plane to fly several sorties each day. Despite superior numbers of Allied planes, the Americans suffered their first defeat of the war.

The lack of air bases in Korea forced the US Army and Far East Air Force (FEAF) to fly from bases in Japan. This allowed the F-80's only five minutes over their targets. "FEAF's net assessment stated: in two years of war in Korea no single factor had so seriously handicapped operational capabilities as the lack of adequate air facilities."[2]

Looking to Falkland War although the Argentine AF outnumbered the British AF, the British had more aircraft closer to the conflict. The Argentines, forced to operate at

extreme ranges, limited them to one sortie per day per aircraft. Had the Argentines been able to lengthen the airfield at Port Stanley and launch fighter aircraft they would have been able to take advantage of their superiority in numbers of aircraft and quite possible have won the war. The British on the other hand were getting four or more sorties per day per aircraft. This resulted in reducing the numerical odds against the British and ultimate British victory.

History has shown us that air bases located in theater, built by combat engineers, can increase sortie generation, and help determine conflict outcome. "History reminds us the success of theater-based combat aviation depends on the availability, reliability, and capability of air bases in the area of operation."[3] In looking to future operations the 1995 thesis points out that "parallel warfare within the context of a smaller AF, high sortie rates gain even greater importance with forward basing contributing significantly to this endeavor."[4]. With the explosion of runways all over the world, can engineers use their already existing Harvest Falcon system to transform these runways into air bases and enable history to repeat itself?

Air Transportable Air Bases

The United States Air Force fielded a transportable air base system known as Harvest Falcon in the early 1990's and successfully used these assets in DESERT SHIELD/STORM and Operation PROVIDE COMFORT. Harvest Falcon assets are organized in four beddown packages. Details of what each package contains and time to setup is included in appendix C. The packages are configured to support squadron-sized units and can be combined with other packages to meet specific mission requirements at different locations (see Appendix C).

The Housekeeping Set is built to meet the needs of housing deployed personnel by providing tentage, water purification and distribution, electrical generation and distribution, fuel storage, latrines, and showers. The Industrial Operations Set expands the deployed air base with facilities that provide the support organizations with additional space, fuel, and electricity to support the air mission. The Initial Flightline Support Set can enhances flightline operations by providing airfield lighting, aircraft arresting barriers, aircraft revetments, and facilities for the full range of flightline and direct aircraft support operations. The Follow-On Flightline Operations Set supplements the Initial Flightline Support Set when more than one squadron is deployed to a base.

Harvest Falcon assets are capable of being deployed via air, land, or sea transportation or they can be prepositioned in a theater. The system is designed to provide a basic platform for combat sortie generation 72-hours after arrival of the civil engineer units in the area of responsibility (AOR).

A recent example is the deployment of the 4th AEF to Doha, Qatar in 1997. In coordination with the Doha International Airport, a team of team of 35 civil engineers completed the basic facilities to support two-thirds of the deployment prior to main body arrival. As a result, personnel were not required to be mass billeted in hangers, and fuel deliveries could be accepted right away.

Summary

The ability of combat engineers to quickly transform a bare base or commercial airport into a fully functional combat air base is a proven capability. Additionally, a viable, tested air transportable air base system is currently in place and can quickly accomplish this mission. In nine days less time than the 14 days it takes the CVBG to

steam from the East coast to the Gulf engineers and their "base kits" can be flown into theater, convert an international runway or bare base into an airbase and erect a complete tent city to house all personnel. The current Air Expeditionary Force concept has proven that within 72 hours of notification the AEF can be bedded down and generating combat sorties equal to 70-75% of those generated by a CVBG. Give combat engineers three more days and they can have an entire tent city complete with all the niceties. Meanwhile, the CVBG still has nine days left to steam before it arrives in the Gulf. We will now look at the likelihood that we could have access to these locations—that is America's preference for allied/coalition warfare.

Notes

[1] Moran, p18
[2] Hicks, p39-40
[3] Byers, et al, p24
[4] Byers, et al, p3

Chapter 5

Future

No one nation can defeat these threats alone.

—National Security Strategy

Coalition Operations

Moran points out that, "even if we look back to the past, across the ocean, and into our fiscal and political house, we do not have a complete picture."[1] While we are learning from the past and our external and internal environment we must attempt to predict what forces will be required to meet the nations future needs.

One frequently mentioned drawback of theater air is its access to airfields in the area of operations. The US' stated preference for coalition warfare in all cases makes access denial to airfields highly unlikely. Should we be denied access the US would be very reluctant to act until coalition agreement was reached first. While the US has spent considerable money on the capability to act unilaterally, we have never been prevented from protecting our vital interests because allies have refused to cooperate.

Our strategy from the National Security Strategy down to individual service strategy makes clear our propensity to fight in a coalition. Accordingly, a central thrust of our strategy is to adapt our security relationships with key nations around the world to combat these threats to common interests."[2] It further says "our military forces will have

the ability to respond to challenges short of war, and in concert with regional friends and allies to win two overlapping major theater wars."[3]

The National Military Strategy echoes this emphasis on coalition warfare. "Our use of military force should be guided by several considerations. While retaining unilateral capabilities, whenever possible we must seek to operate alongside alliance or coalition forces, integrating their capabilities and capitalizing on their strengths."[4] The NMS concludes that " working with our allies, partners, and friends, we will promote peace in an increasingly complex and potentially more dangerous world."[5]

The various defense reviews that have been conducted also stress coalition warfare. The QDR review says "a strategy that emphasizes coalition operations is essential to protecting and promoting our national interests in a world in which we as a nation must often act in concert with others to create our preferred international conditions and secure our basic national goals."[6] The militaries' look to the future contained in JV 2010, also, predicts coalition warfare will remain our preferred method. "Our history, strategy, and recent experience suggest that we will usually work in concert with our friends and allies in almost all operations."[7] It is this cooperative action that has allowed coalition and allied forces to conduct operations over the last decade in the Middle East, Rwanda, Haiti, and Bosnia-Herzegovina. The US NSS notes "our rapidly deployable stateside-based forces, our ability to gain timely access to critical infrastructure overseas, and our demonstrated ability to form and lead effective military coalition"[8] is a key factor in the nation's ability to deter armed conflict and effectively respond when deterrence fails.

Summary

Our national strategy leads to coalition warfare. Therefore, the question of access to airfields is minimized in importance. If we are in a coalition, we are not going to be denied access for theater air. If we can't get a coalition together, we will probably not act until coalition agreements can be reached and access for theater air is restored. We have examined each of the four factors in Moran's model and all point to an alternate force structure focused on theater air. Given fixed budgets, how does the quantity of theater air that can be purchased compare to the quantity of carrier air that can be purchased? How much faster can that equal monetary value of theater air halt a conflict? Which type of air assets can provide America with the best bang for its' buck? We will now analyze that question.

Notes

[1] Moran, p 21.
[2] National Security Strategy, p6
[3] National Security Strategy, p5
[4] National Military Strategy, p12
[5] National Military Strategy, p4
[6] Report of the Quadrennial Defense Review, p8
[7] Joint Vision 2010, p2
[8] National Security Strategy, p9

Chapter 6

Analysis

> *Two tier of responses were possible, the general said. The first tier could be single retaliatory strikes. Since the U.S. Army and Air Force had no forces in the region for immediate action, any strikes would have to be carried out by U.S. naval aircraft based on carriers in the region. These would be limited, punitive strikes. Such attacks could not be sustained very long and probably would not accomplish much in terms of hurting the Iraqi military or economy, Schwarzkopf said.*
>
> —Bob Woodward
> *The Commanders*

How do the capabilities of theater airpower compare to the capabilities of carrier air? Do they bring equal firepower and sortie rates to the fight? Do they make the same contribution to halting a conflict? Do they cost the American taxpayer the same? What is the cost benefit ratio? We conclude that theater air is more flexible, brings more firepower to the fight, generates more sorties, and can be provided in greater numbers for the same cost. All these factors could produce a quicker halt to future wars and offers the American taxpayer a superior cost benefit ratio.

Mattson Study

In 1992, Major Roy Michael Mattson presented the School of Advanced Airpower Studies, his thesis entitled “Projecting American Air Power: Should We Buy Bombers,

Carriers, or Fighters?" His purpose was to determine which form of air power, dollar for dollar, would best serve American power projection requirements in the future.

Study Approach

Mattson's approach was to examine three forms of air power: carrier air, long range air and theater air in terms of their ability to project air power. He defined power projection as "the instrument that will enable American forces to defeat the military strategy of an adversary after crossing territory not owned or occupied by the US."[1] Each form of air power was evaluated for "power" in terms of ordnance load, ordnance flexibility, and mission flexibility. Each was then evaluated on its ability to "project" in terms of speed and autonomy.

Power's subcategories of ordnance load, ordnance flexibility and mission flexibility were defined as follows. The first criteria, ordnance load, measured the tonnage of explosives an instrument can deliver per day. The second criterion was ordnance flexibility as a comparison of the ability of each aircraft to deliver a variety of weapons. The third criteria was mission flexibility, the ability of each instrument to perform the various missions of air power in terms of range, all-weather capability and basic aircraft design/function.

Projection subcategories were speed and autonomy. Speed was defined as the "time required to bring its total force to bear on the adversary and sustain it."[2] Autonomy addresses the political constraints the US faces when attempting to project military power.

Mattson defined theater air in terms of the standard AF Wing equaling three squadrons of 24 aircraft each for a total of 72 aircraft. The theater air package he based his analysis on contained the following air assets:

F-117A air to ground (23)
F-16C/D air to air/ground (72)
F-15C air to air (72)
F-15E air to air/ground (32)
F-4G defense suppression (26)
EF-111 defense suppression (13)
E-3 communication and warning (6)
KC-135R air refueling (62)
EC-130E communication (3)
RC-135 electronic intelligence (3)

Mattson defined carrier air as a carrier battle group consisting of the following vessels:

Aircraft carrier (1) (nuclear powered)
Guided missile cruisers (2)
Guided Missile Destroyers (2)
Destroyers (2)
Submarines (2) nuclear powered
Oilier (1)

Carrier battle group air assets were defined as:

F-14 air to air (20)
F/A-18 air to air/ground (20)
A-6 air to ground (20)
S-3 antisubmarine (10)
E-2C airborne early warning (5)
EA-6B electronic warfare (5)
Ship defense requirements
SH-60F helicopter/anti-sub (6)
SH-60B combat support (6)
CH-46 antisubmarine (2)

Relevant Findings

Mattson concluded that "theater air power [was] the most powerful instrument and the only disadvantage of theater air lay in the time required to deploy and its dependence

on host nation support." [3] i.e. the projection portion of his analysis. His findings are summarized in Table 5.

The only area of weakness for theater air was in the projection categories. Mattson felt these categories were of lesser importance based on the stated policy of coalition warfare and the lack of need for a forced entry capability. Mattson notes that "the US has invested significantly in forces that operate autonomously despite the historical record which indicates autonomy is rarely important. In the post cold war era the US does not have many (if any) vital interests abroad which require a forced entry capability. In both Korea and Iraq the US was part of a coalition which permitted deployment without forced entry. In Vietnam, forced entry was again irrelevant because we had a "host" government. The US has never been prevented from protecting vital interests because allies have refused to cooperate. As long as the US plans to resist aggression by other states, there should be allies ready to provide the access and assistance we need."[4] Therefore Mattson concluded that the weakness of theater air in the projection categories was not significant.

Table 5. Theater Air, Carrier Air, Bomber Comparison

	Theater Air	**Carrier Air**	**B-2**
POWER			
- Ordnance Load	BEST	Distant Third	Second
- Ordnance Flexibility	BEST	Close Second	Close Third
- Mission Flexibility	BEST	Second	Third
PROJECTION			
- Speed	Third	Second	BEST
- Autonomy	Distance Third	Close Second	BEST

The criteria Mattson felt were the most important for air power in the modern age, were mission flexibility and yield power (combination of ordnance load and flexibility).

Mattson's analysis showed theater air was far superior to carrier air in all categories of power.

Yield power is a combination of sortie rates and ordnance load for each form of air power. Based on Desert Storm data Mattson estimated that a carrier could produce, continuously, on average, 45 sorties a day. The ordnance load for carrier air was determined as follows. The ordnance load for the A-6 was 90 tons (30 sorties per day with a load of 6,000 lbs. per sortie). F/A-18s can deliver approximately 22.5 tons per day (15 strike sorties a day at 3,000 lbs. per sortie). Based on these numbers a carrier wing can sustain an air campaign delivering 112.5 tons of ordnance a day.

For theater air the calculations for sortie rates and ordnance load are figured at 1.7 sorties per day for the F-16, 1.2 per day for the F-15E, and an estimated 0.85 sorties for the F-117A. As a result, 72 F-16's will fly 122 sorties, 32 F-15Es will fly 38 sorties, and the 23 F-117As will fly 19 sorties per day. For ordnance load the F-16s will deliver 183 tons of ordnance per day (122 sorties times 3,000 lbs. per sortie), the F-15s will deliver 114 tons (38 sorties at 6,00 lbs. per sortie) and the F-117A will deliver 38 tons (19 sorties at 4,000 lbs. each). Total air ordnance load amounts to 335 tons per day for theater air.

Table 6 summarizes the yield power results for theater versus carrier air. Theater air can generate four times the number of sorties delivering three times more tons per day of ordnance.

Not only can theater air deliver more ordnance but it also offers the most flexibility in targeting and precision. "This implies that regardless of the intensity of the conflict, or the nature of the target set, theater air will offer the most options."[5]

Table 6. Yield Power Comparisons

Platform	Sorties/day	Ordnance tons/day
CVBG -F/A 18	15	22.5
CVBG - A-6	30	90
TOTAL CVBG	**45**	**112.5**
TA- F-15E	38	114
TA – F-16	122	183
TA – F-117A	19	38
TOTAL TA	**179**	**335**

Mattson noted several flexibility limitations of carrier air. First the F/A-18 is not able to laser designate targets for delivery of laser guided bombs. Secondly, the limited munitions stores aboard the carrier did not allow the carrier air mission to be tailored as easily as theater air. The weapons load is usually determined before the carrier knows the kinds of missions will be required. For example they arrived in the Gulf with no penetrating weapons (like the I-2000). Even if the Navy had the proper munitions in its inventory, there is only a particular subset of that aboard the carrier.

Mattson's Conclusions

For power projection, as defined in Mattson's analysis, theater air power is the predominate player. "It is superior in the broadest sense of the word, economically, militarily, and politically."[6] Theater air can deliver three times as much ordnance and generate four times as many sorties.

Theater air's only liability is difficulty in projecting if foreign access is denied. He concludes, "given the nature of future conflicts, regional and tied to vital US interests, theater aircraft will continue to dominate power projection."[7] This liability only becomes significant if US vital interests/allies abroad could be isolated from deploying theater air power.

"Carrier air power is viable only if they could bring to bear sufficient power to prevent such things as the fall of South Korea (1950) or the fall of Kuwait (1990). It is very unlikely that a CVBG could stop such an invasion. It appears that for all scenarios we will ultimately have to bring to bear sufficient theater air to bear to protect vital interests."[8] Thus carrier main contribution is the ability to provide battlefield protection for surface forces beyond the range of theater air. Only for forced entry scenarios (Falklands) or amphibious landings beyond the range of theater air (Inchon), is carrier air essential. Those scenarios, although we have heavily invested in the capability to perform them, seem highly unlikely in the future.

Cost Comparison

Having established the superiority of theater air in sortie rates, ordnance delivery and mission flexibility one must ask, in these times of military downsizing, what the comparable costs of theater and carrier air are.

Major David Timms, ACSC Class of 1998, provided us with a "Cost Analysis and Air Expeditionary Force Comparison" developed by the Quadrennial Defense Review Cell at the Pentagon. The full briefing is included in Appendix E.

The notional composition of the CVBG used to cost out the price of carrier air was:

(1) Aircraft carrier (CVN-68 "Nimitz" Class)

(2) Aegis Cruisers (CG-47 "Ticonderoga" Class)

(2) Aegis Destroyers (DDG-51) "Arleigh Burke" Class)

(2) Destroyers (DDG-993 "Spruance" Class)

The carrier air composition was:

(36) F/A-18E/F

(14) F-14D

Table 7. CVBG Cost

		($M FY97)		
Platform	Quantity	Procurement*	30 year O&S**	Total
CVN-77***	1	5,387.0	5,952.0	11,339.0
CG-47	2	2,510.2	1,642.2	4,152.4
DDG-51	2	1,871.3	1,462.8	3,334.1
DD-963	2	766.6	925.2	1,691.8
SSN-688	2	1,551.2	906.0	2,457.2
F/A-18E/F	36	1,665.7	2,548.8	4,214.5
F-14D	14	720.9	1,313.3	2,034.2
Totals		15,305.7	14,750.3	30,056.0

Notes: * Procurement figures for all except CVN-77 based on unit recurring cost presented in respective SAR

** O&S figures for ships based on force Acquisition Cost Model Database based on FY98 POM funding. O&S for aircraft based on respective SAR

*** CVN procurement cost includes unit recurring and initial nuclear fueling costs from CVN-68 Nimitz class SAR and projected nuclear refueling/complex overhaul cots of CVN-68 as presented in FY 96 budget request. Given 52 year LC of CVN, the total is annualized to a 30 year life cycle cost (LCC).

The cost comparison made several assumptions. It assumed that Carrier acquisition costs, including nuclear refueling and complex overhaul, reflect a 52-year life cycle. All other CVBG ship assets were annualized over a thirty-year life cycle. Resupply assets are not included in the costs because it is assumed that resupply requirements for remote airbase and CVBG are similar. The costs only include fighter/attack assets and support assets are considered equitable. Acquisition and Operations and Sustainment (O&S) costs are taken from respective Selected Acquisition Reports (SAR). No consideration of attrition, training, pipeline or reserve aircraft costs are included. Life cycle for the F/A-

18E/F is assumed to be 20 years and for the F-14D 30 years. No RDT&E or sunk costs are included.

The cost breakdown of carrier air is depicted in Table 7 and the cost breakdown for theater air wing is in Table 8. Comparison of the costs for a CVBG and its aircraft and the notional tactical fighter wing equivalent is depicted in Table 9.

The final cost comparison of theater air to carrier air shows carrier air costs 2.5 times that of theater air costs and delivers only 3-5% of the offensive sorties and a third the tons per day of ordnance.

Table 8. Theater Air Wing Equivalent (TFWE) Cost

Platform	#	Proc*	30 yr O&S	Total
F-15E	24	1,238.4	3,968.1	5,206.5
F-22A	48	3,603.8	3,339.0	6,942.8
Totals	72	4,842.2	7,307.1	12,149.3

Notes: * F-15E procurment figures provided by USAF. Remaining procurment and O&S figures based on respective aircraft SAR.

Table 9. Cost Comparison of Carrier Air to Theater Air

	Procurement	30 year O&S	Total 30 year LCC	Annual Cost
CVBG	$ (M) 15,305.7	$ (M) 14,750.3	$30.1 B	$1.0 B
TFWE	$ (M) 4,842.2	$ (M) 7,307.1	$12.1 B	$0.4 B
			CVBG 2.5 times the cost of TFWE	

When comparing a CVBG and an Air Wing one must take into account the CVBG employment cycle that dictates how many CVBGs are required to keep one carrier deployed. According to the Navy aircraft carrier requirements model and Navy publications the following information determines the number of carriers required. Currently 11 active carriers are required to meet the peacetime policy of “tethered presence” in three major theaters: Indian Ocean/Arabian Sea, Mediterranean Sea, and the

Western Pacific Ocean. Continuous presence in the Indian Ocean/Arabian Sea requires approximately seven carriers. Continuous presence in the Mediterranean Sea requires five carriers and in the Western Pacific Ocean two carriers because presence there is mostly met by permanent basing of a carrier in Yokosuka, Japan. The Navy is capable of surging two to three carriers within 14 days and five additional carriers in theater within 40 days. Bottom line is that 11 carriers are required just to have one carrier in each of the three areas of operations most of the time. That equates to a nearly 4:1 ratio of carriers required to have one in or on the way to the theater.

Why is this 4:1 ratio required? It is based on the CVN employment cycle and primarily driven by the personnel tempo policy of the Navy. A CVN spends 14 months in interdeployment phase, six months in deployment and 24 months in overhaul phase. That equates to 4 six-month deployments in a nine-year cycle. In addition, each CVN requires one nuclear refueling/complex overhaul over its 52-year life span and is out of commission for years during this overhaul.

The Feb 1993 General Accounting Office (GAO) Report to Congress entitled "Navy Carrier Battle Groups: The Structure and Affordability of the Future Force" concludes that "relying more on surface combatants and amphibious assault ships…for presence and crisis missions could allow carriers to remain closer to their home ports and permit a smaller carrier force. Options are available to enable the Navy to maintain continuous presence…with considerably fewer than the notional 15 carriers. These options would inevitable be more onerous to the Navy than current operations and might produce somewhat less capable carrier battle groups."[9]

To compare the Air Wing and Carrier Air assets fairly, one must take into account that the CVBG brings with it theater missile defense. The air relocatable base does not and therefore we have included the cost of a Patriot Missile Battery in our Air Wing costs. According to Major James Wood, USAR Patriot missile officer, an air base could be defended by one battery. Each battery has eight launchers. The launchers in current technology can be remoted to expand the defendable footprint. One battery employs approximately 100 people. Major Wood expected the HQ element and Maintenance Company to be collocated at the base with the firing battery. This would bring the total number of personnel to approximately 300. He also felt that manpads or Stingers or both would be required depending on the threat. Each Patriot battery normally has two Stingers teams that would be used to cover the dead zones in the Patriot radar coverage.

The costs for the Patriot are estimated as follows:

Table 10. Patriot Battery Cost

	Procurement	O&S	Total
Patriot Firing Battery	$150M	$0.22M	$150.22M

Note: Assumed 30 year LC for Patriot. Proc cost of $1.2B per battalion. O&S cost of 1.75M per battalion. Assume eight batteries in a battalion.

Taking the cost data and marrying up Mattson's sortie and ordnance loads (i.e. yield power) one can compare the capabilities of CVBG air (fighter aircraft only, total of 50 aircraft) to a TFWE (total of 72 aircraft). Using the BUR forces of 12 CVBGs and 20 TFWE the ratio of fighter aircraft, number of sorties and ordnance load can be compared as follows in figure 6.

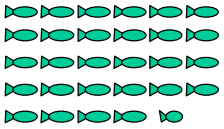
	CVBG	TFWE	Ratio (CVBG:TFWE)
# units	12 CVBG	20 TFWE	
Aircraft			1:2.4
Sorties			1:9.6
Ordnance =3,000 lbs			1:28.8

Figure 7. Sortie to Ordnance Comparison

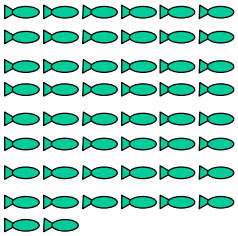
	CVBG	TFWE	Ratio (CVBG:TFWE)
# Units	9 CVBG	26 TFWE	
Aircraft			1:4.2
Sorties			1:16.8
Ordnance =3,000 lbs			1:50.4

Figure 8. Sortie to Ordnance Comparison

Keeping the budget constant, we have compared the yield power difference of a force structure with three less CVBGs (total of 9 CVBGs) and an increase of six TFWE

(total of 26 TFWE, to include Patriot batteries). The comparison of yield power for fighter aircraft of the CVBG and the TFWE is shown in Figure 7.

In summary, a force with 12 CVBGs and 20 TFWEs can deliver approximately 89,000 lbs of ordnance per day. On the other hand, a force structure of 9 CVBGs and 26 TFWEs can deliver over 154,000 lbs of ordnance per day. It seems intuitively obvious that the second force structure (9 CVBGs/26 TFWE) which can deliver 1.75 times the amount of ordnance would be able to halt a conflict sooner. If so then by how much?

Determining Time to Halt

So far, we have established theater air's strength to carrier air in a number of categories. First theater air can generate four times the sorties and deliver three times the ordnance load and less than half the cost. Its mission flexibility is greater to carrier air. What do all these advantages of theater airpower equate to in time to bring a conflict to a halt? Can theater airpower really deploy in time to respond to a major theater war or two near simultaneous MTWs?

To determine this we analyzed four different scenarios to determine the impact the BUR force structure and a theater-air emphasis structure would have on halting a conflict. The scenarios were a BUR force and a theater-air emphasis force in Southeast Asia (SEA) and a BUR force and a theater-air emphasis force in Southwest Asia (SWA). In the BUR scenarios the total force, that is twenty fighter wing equivalents and twelve carrier battle groups, were split between the two theaters. In the theater-air emphasis scenarios six additional theater air wing equivalents were added to the BUR force and three CVBG battle group air wings were removed from the BUR force.

The modeling was done using the USAF Wargaming Institute's Joint Education Mobility Model (JEMM) to simulate the deployment of theater airpower. The inputs and parameters used in the scenarios are provided in Appendix D.

Only offensive aircraft sorties were used to determine the time to halt. The Gulf War Airpower Survey provided the number and type of sorties performed in Desert Storm by each aircraft. This data was used to develop the percentage of offensive sorties each aircraft platform would fly. In this process the offensive role was defined as air interdiction, close air support, and offensive counter air missions. The defensive role was defined as defensive counter air, reconnaissance, support, training, and other missions.

Defining the Halt Phase

The most difficult aspect of comparing the two force structures was determining what constitutes halt. The most accepted definition of the halt was when the enemy's forward line of troops (FLOT) stopped advancing. But again, what causes the enemy FLOT to stop moving? Is it gaining air superiority, or a destruction of a certain percentage of enemy aircraft or armored vehicles or disabling a certain percentage of the front line troops? Even if one of these does constitute halt, how does one determine the number of sorties or tonnage required causing the desired effect? In reality, what determines when an enemy "halts" is not only a combination of these and other material factors, but also the non-material factors such as leadership, moral, and the cause for which they are fighting.

In his book "How to Make War," Dunnigan points out that "at 30 percent loss levels, divisions show serious signs of disintegration. This is the optimal time to take a division

out of battle and rebuild its combat branches. Combat beyond this point will practically wipe out a division's combat power."[10]

The Lockheed Corporation used the 30 percent attrition level as a benchmark to define the start of the halt phase. Specifically Lockheed Corporation defined the start of the halt phase after destruction of thirty percent of the enemy armored vehicles.

Based on these sources, in this study we elected to use the same parameters as Lockheed Corporation in determining halt.

Effectiveness of Theater Air as Compared to Carrier Air

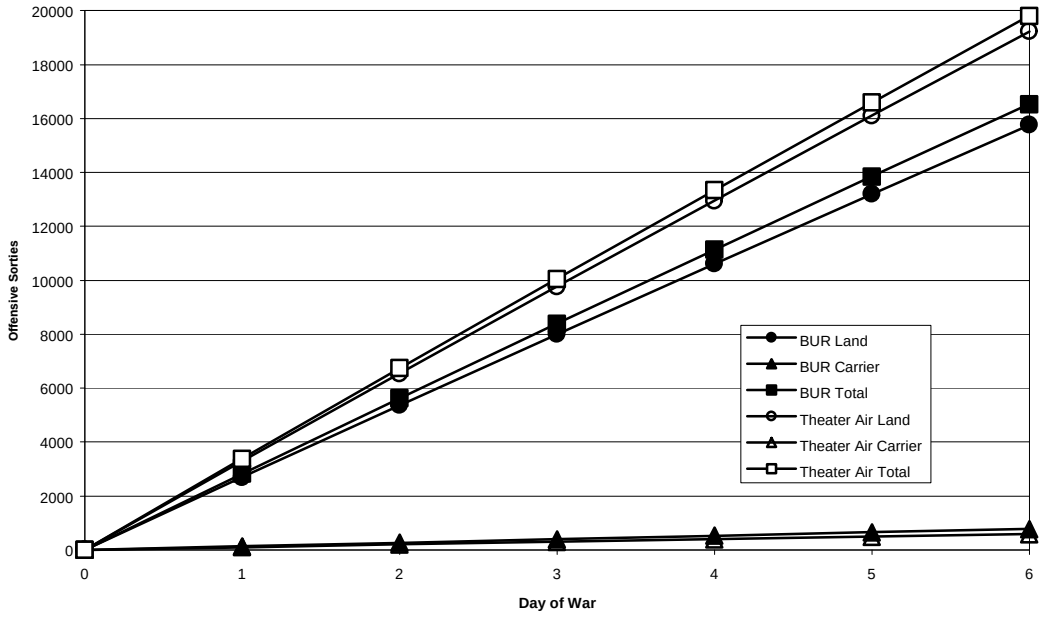


Figure 9. Comparison of Carrier Air to Theater Air in SEA

Figure 8 provides a comparison of carrier air to theater air. It is very important to note that carrier-air provides less than five percent of the overall offensive sorties. The limited impact of the carrier air is due to the limited aircraft on a carrier, the inability of a

carrier to conducted 24-hour operations on a continuos basis, and the requirement to place a majority of those aircraft in the defense of the carrier itself.

SEA Theater Data

The deployment phasing for Global Engagement Three was used as the basis of the SEA scenario. The arrival dates, determined by using JEMM, of fighter and bomber aircraft are shown in Appendix D for the BUR force and the theater air emphasis force. The resulting sortie rates are shown in Figure 9. The impact of a theater-air emphasis is a reduction in the time to halt by seventeen percent.

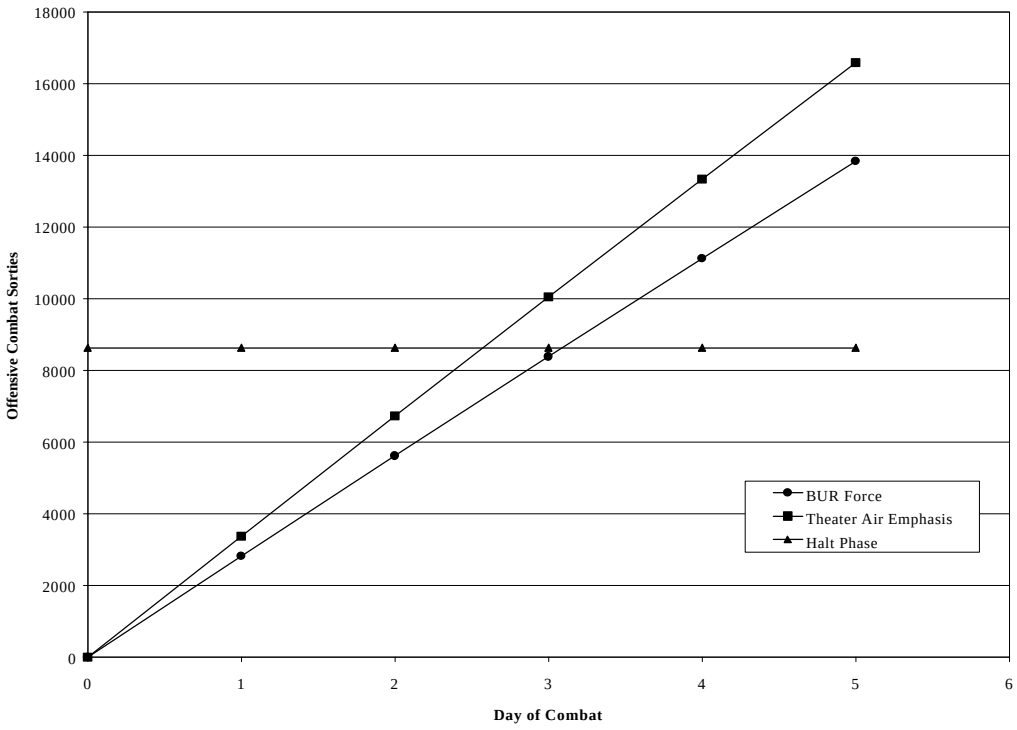


Figure 10. Southeast Asia Theater Sorties to Halt

Southwest Asia Theater Data

The force structure for the SWA scenario was developed by creating an equivalent "Global Engagement Three" force structure with the remaining USAF units. Units

deployed to SEA were not used in the SWA scenario. The arrival dates, determined by using JEMM, of fighter and bomber aircraft are shown in Appendix D for the BUR force and the theater air emphasis force. The impact of a theater-air emphasis is a reduction in the time to halt by eighteen percent (see Figure 10).

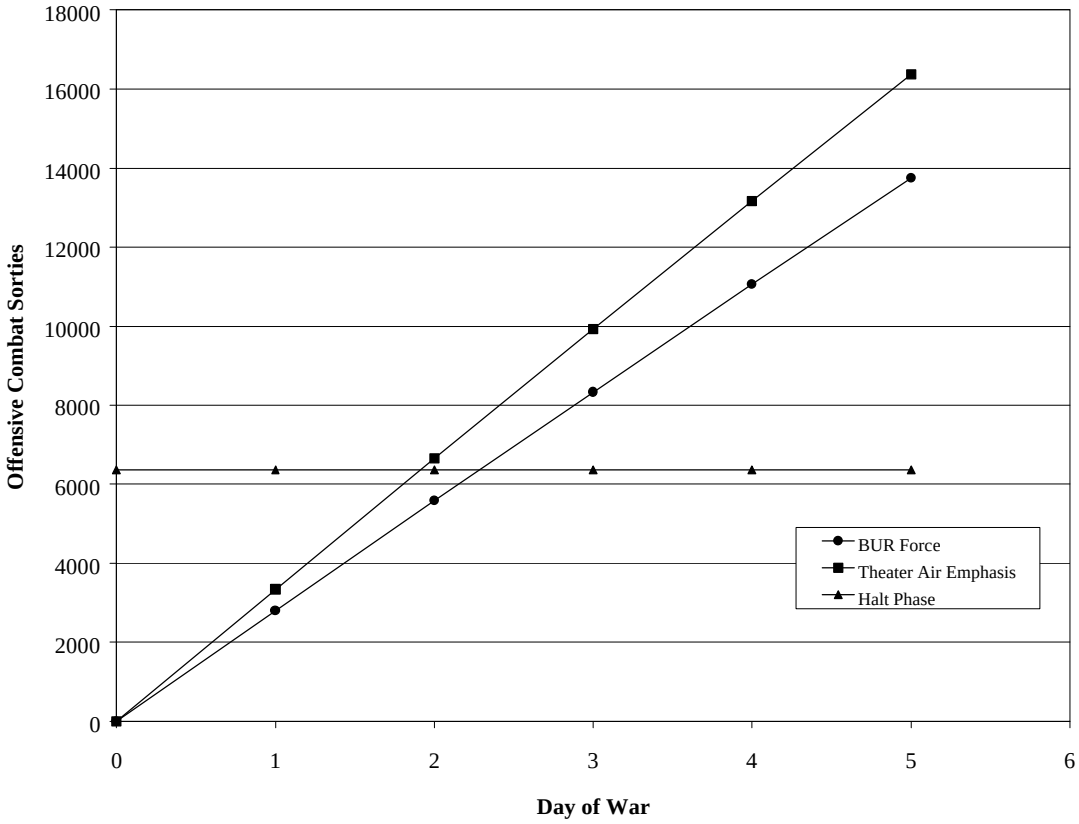


Figure 11. Southwest Asia Sorties to Halt

Summary

Theater air is vastly superior in all aspects as compared with carrier air. Theater air can generate four times the number of sorties and carry three times more tons per day of ordnance. It offers the best flexibility of types of ordnance it can deliver using precision weapons. It also has the best mission flexibility with its ability to perform various missions in terms of range, all-weather capability and basic aircraft design/function.

When modeling force structures with a theater air emphasis, these advantages proved theater air's overwhelming superiority in offensive sortie generation and thus its ability to halt the conflict sooner.

Carrier air's contribution to halting the conflict is negligible. Table 11 shows the contribution of the BUR force structure compared to the theater air emphasis force structure. Carrier air contributes, at best, only five percent of the offensive sorties that contribute to halting the conflict. This is due to several factors. We analyzed these factors using the Gulf War Survey database and are included at Appendix D. First, over 63 percent of sorties flown off a carrier are defensive, flown to protect the carrier itself. Secondly, a carrier can only generate about 45 sorties a day. Thirdly, the ordnance the carrier aircraft can deliver is significantly less than theater air due to light bomb loads required to physically takeoff from the carrier deck.

Table 11. Force Comparison

	Theater		Combat Sorties	Days to Halt	Force Cost ($B) *
BUR Force	Korea	20 TFWEs	8236	3.1	23.0
		12 CVBGs	404		
	Iraq	20 TFWEs	6060	2.3	
		12 CVBGs	300		
Theater Air Emphasis	Korea	26 TFWEs	8387	2.6	23.0
		9 CVBGs	253		
	Iraq	26 TFWEs	6172	1.9	
		9 CVBGs	188		

Note: *Cost includes one Patriot battery per TFWE.

Therefore carrier air's contribution to halting the conflict is minimal. The only reason that the days to halt differ with the BUR force structure and the theater air emphasis structure is that the second force structure eliminates three CVBGs. With this

savings we can increase the amount of theater air which in turn equates to more offensive sorties and a quicker halt of the conflict.

A cost comparison of theater air and carrier air shows that carrier air costs two and half times more than theater air and contributes less to ultimately halting the conflict. With the addition of six TFWEs the over all cost is about equal but results in halt 12 hours earlier in the Korean scenario and eight hours in the Iraq scenario. This equates to halting the adversary 20% faster resulting in less time our forces are in harms way and fewer casualties on both sides.

Theater air's only disadvantage is its dependence on access to foreign airfields. This disadvantage is mitigated by US' preference for coalition warfare and the fact that international airfields, that civil engineers can convert in 72 hours to air bases, abound in all parts of the world.

Notes

[1] Mattson, 14.
[2] Mattson, 14.
[3] Mattson, 49.
[4] Mattson, 16-17.
[5] Mattson, 49.
[6] Mattson, 1.
[7] Mattson, iii.
[8] Mattson, p51.
[9] CVBG Cost Analysis & AEF Comparison, slide 11.
[10] Dunnigan, p 503

Chapter 7

Recommendations

> *The single clear lesson of World War II was that the visionaries were correct that all future warfare would be dominated from the air. They agreed on that. What they argued about was just how airpower would dominate surface warfare.*
>
> —David MacIsaac

Carrier Battle Groups certainly bring many capabilities to a theater CINC in the event of a crisis. Their ability to act as a deterrent to war is evident every day. However, once the fighting starts, the carrier brings real but relatively insignificant firepower to bare to affect the halt phase of a conflict. Carrier air contributes only three to five percent of the offensive sorties and one to two percent of the ordnance used to halt an offensive. Our analysis shows that more cost effective force structure mixes exist. Through a detailed analysis of the internal, external, historical and future factors, we proved that land-based airpower brings more firepower to bear on the enemy and can halt the war faster.

Analysis of the internal factors leads to the conclusion that under the current budget constraints neither the BUR or QDR force structure is affordable—a $20 billion per year shortfall exists. Lockheed-Martin and Colonel Bath's studies propose that changes in the force structure mix between carrier based airpower and land-based airpower warrant further review. These studies indicate that the war can be halted sooner, with less

expense by decreasing the number of CVBGs to nine and increasing the number of TFWEs to twenty-six.

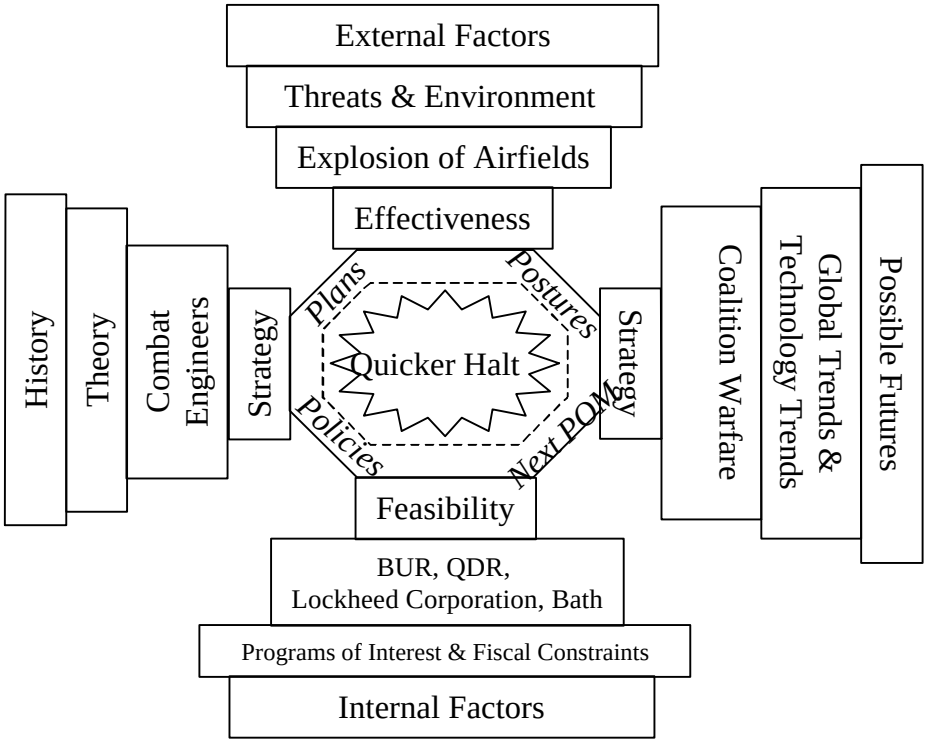


Figure 12. Moran Model Summary Chart

External factors included the explosion of airbases all over the world increasing our access to theater bases—more than 2000 airfields over 8000 feet exist today. In 1950, there were only two concrete runways in South Korea, today there are 110 paved runways in South Korea. Lockheed-Martin found only two of the most likely 15 scenarios required carrier based air. This explosion in new airfields offers us the opportunity to base our land based airpower close to the fight anywhere on the globe.

The history of civil engineers showed that the location and number of theater airfields made a significant difference between victor and vanquished. Combat engineers have proven that they can quickly and inexpensively convert these airfields for operational use. This capability already exists and the force structure is available to put it

to use within 72 hours of notification. Civil engineers like those of the 4th AEF have demonstrated successfully this capability.

A look to our future points to coalition warfare. Our doctrine and strategy documents all clearly state this preference. We expect to have partners throughout the world in all future major conflicts. It is very difficult to envision any conflict that we will fight where we do not have coalition partners, with access to airfields for our use within striking distance of the enemy.

Land-based airpower brings twice as many aircraft, four times the sortie rate and three times the firepower to bear on the enemy compared to carrier-based airpower. These additional offensive sorties lead to a 20 percent faster halt of the adversary.

An examination of the cost benefit of carrier air shows that the CVBG brings only three to five percent of the offensive sorties required to halt the war. At an annual cost of over $1 billion per CVBG, contributing less than five percent of the offensive sorties required to halt an adversary. The CVBG has a very low cost benefit ratio. In comparison, a TFWE that delivers 95% of the offensive sorties that determine halt and costs the taxpayer only $0.4 B annually. For 71% of the total per unit cost the CVBG provides 5% of the offensive halting sorties. For 29% of the total unit cost, theater air provides 95% of the offensive halting sorties. A significant increase in the cost benefit ratio for theater air. The American taxpayer gets the biggest "bang for their buck"—with theater air. In addition more theater air can halt the war faster resulting in less American lives lost.

CVBG's strength lies not in providing significant firepower to halt a conflict but in offering an excellent flexible deterrent option to the National Command Authority.

However, credible forward presence and crisis response can be done more cost effectively with joint operations consisting of the NETFs, TFWs, bombers, and airlifted army forces or as suggested by the GAO relying more on surface combatant and amphibious assault ships. Fewer carriers can still provide adequate deterrence and the savings of reducing the Navy to a total of nine CVBGs can be invested in theater air, resulting in halting our adversary's faster should deterrence fail.

"As the Secretary of Defense's *Annual Report* explained in 1997: In most cases, if US forces can accomplish this critical objective promptly (halting the adversary), it is far more likely that objectives in the later phases of the conflict (including reducing the enemy's warmaking capabilities, ejecting enemy forces from captured territory, and decisively defeating them) can be achieved sooner and at less cost and risk."[1] This gift of time "changes the picture for the counterattack. Once the enemy force is contained and does not pose a threat of offensive maneuver, the CINC may choose several courses of action to carry out national objectives."[2] There may be situations where ground forces are not needed to obtain objectives after halt is achieved. A successful and faster halt results in less casualties, less chance of eroding the American public's will to fight and the requirement for less ground troops and more time to get them into theater if needed.

Our analysis proved that investing the CVBG reduction savings in additional theater air assets results in halting our adversary 20% faster. How significant is 20%? In June 1950 Carrier air saved UN forces and halted the North Koreans at the Pusan perimeter. A halt 20% slower in this instance could have meant the North Koreans reaching the Port of Pusan. The resulting "Dunkirk" would have made the eventual success in Korea infinitely more difficult politically and militarily and may have emboldened adversaries

elsewhere. In the future, this gift of time could mean halting Iraqi forces just North of Kuwait City instead of just south of it.

What's the value of halting the fight sooner? To an American public concerned with bringing their children home alive, the gift of time afforded by theater air is priceless. The QDR states that "Failure to halt an enemy invasion rapidly can make the subsequent campaign to evict enemy forces from captured territory much more difficult, lengthy and costly."[3] Theater air can halt the war faster, at no additional cost to the American taxpayer, resulting in faster, cheaper wars that end with fewer casualties and a better state of peace.

Notes

[1] Grant, pg. 17.
[2] Grant, pg. 17-18.
[3] QDR, pg. 13.

Appendix A

Lockheed-Martin Study

Appendix B

Understanding Culture, Strategy, Air Power, and The Gift of Time

Appendix C

Harvest Falcon Data

Table 12. Harvest Falcon Beddown Package Requirements

HARVEST FALCON BEDDOWN PACKAGE REQUIREMENTS			
Package	One Squadron 1,100 Personnel	Two Squadrons 2,200 Personnel	Three Squadrons 3,300 Personnel
House Keeping Set	1	2	3
Industrial Operations Set	1	2	1
Initial Flightline Support Set	1	1	1
Follow-on Flightline Operations Set	0	1	2

Source: Air Force Handbook 10-222, Volume 1, *Guide to Bare Base Development*, 1 July 1996.

Appendix D

Joint Education Mobility Model (JEMM)

Game Parameters:

- The SEA (Korea) theater starts first
- The second MTW (SWA-Iraq) starts 30-days after SEA
- D-Day occurs on or after C-Day +15
- Civil Reserve Air Fleet stage II occurs on the first MTW C-Day
- The USAF get 30 percent of the strategic airlift for the two MTWs
- The Army and Navy get 60 percent together and the remaining 10 percent is allocated to the other combatant commanders
- The USAF will use all 30 percent to support the first MTW
- When the second MTW starts the USAF will use 25 percent to support the second MTW and 5 percent to support the first MTW
- The F-22A and Joint Strike Fighter (JSF) are equivalent to the F-15E for purposes of determining roles and sortie rates
- Additional wings will be two-thirds F-22A and one-third JSF
- The proportion of offensive to defensive sorties for each aircraft platform will be the same as in Desert Storm (see Table 13)

- Aircraft sortie rates are as listed in Table 14
- Two aircraft carriers are required for continuos 24-hour aircraft operations

Table 13. Primary Roles of Aircraft Types

Aircraft	Offensive %	Defensive %
B-52	100%	0%
F-14 (USN)	15%	85%
F-15C	20%	80%
F-15E	98%	2%
F-16C	95%	5%
F/A-18 (USN)	56%	44%
F/A-18 (USMC)	90%	10%
F-117	100%	0%
OA-10	100%	0%

Source: Gulf War Air Power Survey, Volume V, Washington D.C. 1993.

- Aircraft carriers will be directed to the AOR on/or prior to C-Day such that all carriers for a theater will be on-station prior to D-Day
- Under the BUR force structure four carriers are available for each MTW, under the theater air emphasis force structure three carriers are available for each MTW

Table 14. Aircraft Sortie Estimate

Aircraft	Role	Sorties Per Day
F-15C	Air to Air	4
F-15E (F-22A/JSF)	Air to Ground	3
F-16	Air to Air	5
F-16	Air to Ground	4
F/A-18	Air to Air	3
F/A-18	Air to Ground	3
F-117	Air to Ground	2, hours of dark only
OA-10	Air to Ground	5
B-1	Air to Ground	1
B-2	Air to Ground	1, hours of dark only
B-52	Air to Ground	1

Source: Major Mike Senna, Major Senna worked at checkmate and is an expert in this area.

- Four sorties are required to destroy one armored vehicle

- 8640 sorties are required to halt the North Korean forces (7200 armored vehicles x 30 percent x 4 sorties per kill)
- 6360 sorties are required to halt the Iraqi forces (5300 armored vehicles x 30 percent x 4 sorties per kill)

Appendix E

Carrier Battle Group Cost Analysis

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